The Cairn Research

Classic Source Lamphouse

User Guide 2.1

75 Watt Classic Light Source

Aug 2001

I. Important - Please read before installation

For maximum reliability we recommend using the equipment within certain guidelines. If in any doubt, then please feel free to contact our technical support department (e-mail tech@cairnweb.com).

The following points should be considered when using the Classic source:

1. **Xenon arc lamps are pressurised and a potential hazard.** Please refer to the relevant section of the manual when changing lamps, and always wear suitable protective goggles.
2. Hold the lamp by the electrode base to avoid contact with the glass. Skin contact will leave behind a residue, which with heat will blacken and therefore reduce light intensity and the lamp's life.
3. To avoid arcing between the anode connector arm and the lamphouse, position the arm at 45° (Pointing to the bottom right hand corner of the assembly when viewed through the quartz window).
4. Be careful not to strain the lamp during installation, as it is easy to break off the cathode connection if significant bending or twisting forces are applied. If you have any problems in installing the lamp, please phone for further advice. Neither the manufacturer's nor our own guarantee, cover lamp breakage during installation, so please proceed with CARE!!
5. **Use suitable protective eyewear when focussing the light.** The short wavelengths generated by the arc lamp are potentially hazardous, so care should be taken to avoid direct exposure to the beam.
6. Do not operate the power supply without a lamp installed in the lamphouse, this can lead to equipment damage and failure (although you still have to try hard!).
7. The lamps we supply for use with our light source have a built in filter to cut off the short wavelengths which generate ozone, so there is little or no ozone emitted from the light source.

II. Package Contents

Light Source (includes lamphouse and power supply)

- Opto- 75W
- Classic 75W
- Opto- 150W

Coupling Hardware

- Diaphragm coupling with focussing assembly
- Liquid light guide
- Basic lamphouse light guide coupling, with provision for two filter sliders
- Lamphouse light guide mount with manual shutter & provision for two filter sliders
- Lamphouse light guide mount with automatic shutter & provision for two filter sliders
- Filter slider for lamphouse coupling
- Direct epifluorescence coupling [for ..... Microscope]
- Indirect epifluorescence coupling [for ..... Microscope]
- Beam collimator [for ..... Microscope]

Cabling

- Mains leads
- Light source power lead

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1 Introduction

The Cairn classic light source comprises of two components; namely a lamphouse and an appropriate power supply for the lamphouse. In addition, components for connecting the light source output to a fluorescence microscope via an epifluorescence port will usually be supplied. This connection will take one of three forms: A direct coupling, an indirect coupling, or a beam collimator. The direct coupling relays the light from the light guide directly into the rear of the objective; the indirect coupling relays the light via aperture and field stops to the objective; and the beam collimator relays the light into the entry port of the microscope manufacturers epifluorescence coupling.

The classic lamphouse has been on sale for the best part of a decade now, and it's been very successful. We originally designed a 75W lamphouse and power supply because our customers were fed up with having their measurement equipment fried by other manufacturers' light sources (more about this below). This is a thoroughly tried and tested design, which is suitable for many applications and uses our well-established 75W power supply with constant-power regulation for stable output and long lamp life. It uses switch mode technology for compact size, minimum heat generation and universal power input requirements (90-250V, 50-60Hz). Following the introduction of our Optoscan monochromator, we began selling more systems to customers with interests in high-speed imaging, where the highest possible light intensities are required. The Classic source actually works well with the Optoscan, but the Optosource has been custom-designed for this application, and gives typically 2-3 times more light (the exact improvement depends on the input slit width, which is variable in our design). For other applications, including flash photolysis, the Optosource allows more efficient coupling of the light output into a smaller diameter light guide, which is likely to be translated into a higher light intensity at the experimental sample. From theoretical considerations we expect an approximately two-fold improvement.

For many users the most important feature of our light sources is that they can be used safely in close proximity to any other equipment! While xenon lamps typically run at only about 10-20V, they require a high-voltage trigger pulse of around 30KV to initiate the arc. Some other manufacturers seem to ensure that this trigger voltage reaches the lamp by spraying it around everywhere else as well, which makes short work of any semiconductors in the vicinity, such as those in your computer, for example. Our approach is to generate the high voltage pulse INSIDE the lamphouse, which is electrically screened, and to do so in a way that is balanced with respect to ground. This is another tried-and-tested feature, so we can confidently say that it will NOT damage your other equipment.

It is important to mention here that the two types of lamp that the classic lamphouse supports (75W xenon or mercury/xenon continuous, and xenon flash) require different mountings. This prevents the wrong lamp being used with your system. However, it is quite easy to change the mountings if required. It is also possible to upgrade from the Classic to Optosource, as a number of components are identical. Please contact our sales department for further details if you are considering this option.

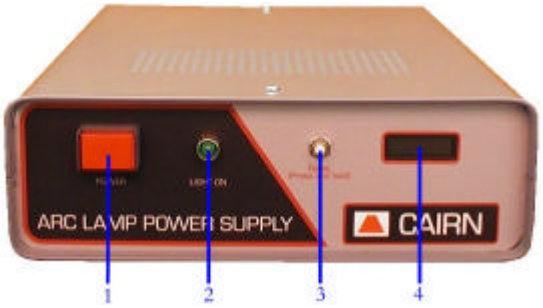
2 Installation guide

Before beginning to install a Cairn system it is advisable to have to hand an oscilloscope (any age or condition is fine provided that it's not completely dead!), screwdrivers, Allen keys, and safety glasses. We would also urge our customers to take some time to carefully check the delivery note to make sure that they can identify all the components. Having checked that all components are present and correct the next step is to assemble and test the different sections of the system.

2.1 Illumination system components

Lamphouse power supply

Front Panel



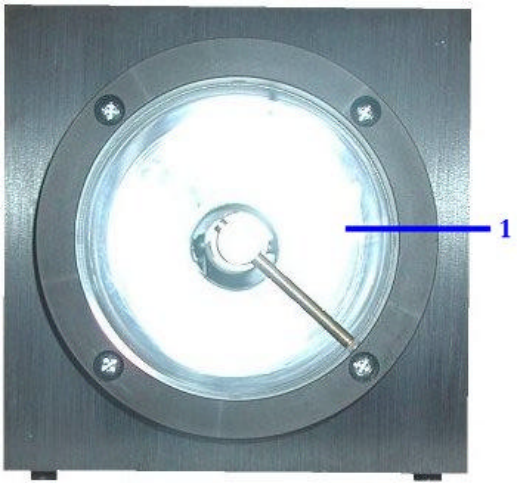
1. Power Switch
2. Lamp on indicator
3. Timer reset
4. Hours of use display

Rear Panel

1. Power connector to lamphouse
2. Mains power socket

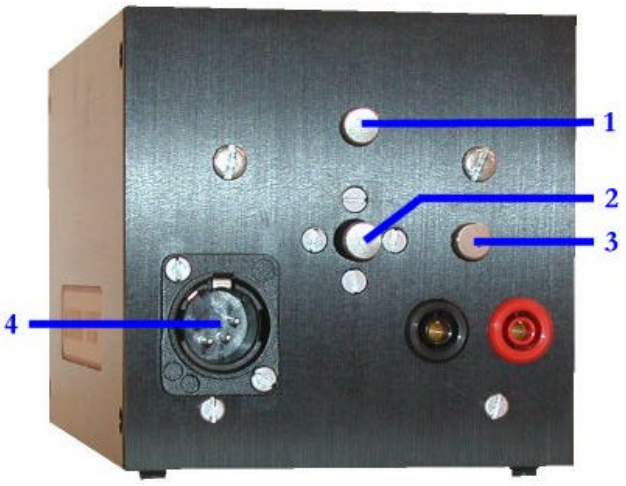
Lamphouse

Front Panel



1. Output window

Rear Panel



1 & 3. Arc horizontal and vertical adjustments
2. Arc focussing adjustment
4. Arc lamp power supply connector

2.2 Illumination system couplings and mounts

Lamphouse coupling tube (with integral iris)

Lamphouse light guide coupling (with provision for two filter sliders)

Image not available

Filter slider for lamphouse coupling

Image not available

Liquid light guide

Microscope light guide mount

Microscope coupling

(Nikon coupling shown)

2.3 Lamp Installation

As delivery companies are inclined to treat packaged equipment with less respect than perhaps they should, we have found it prudent to remove lamps from the lamphouses after testing. This saves the inconvenience of finding a sharps bin to empty the lamphouse contents into, and ensures you receive both a lamp and lamphouse that are functional on arrival.

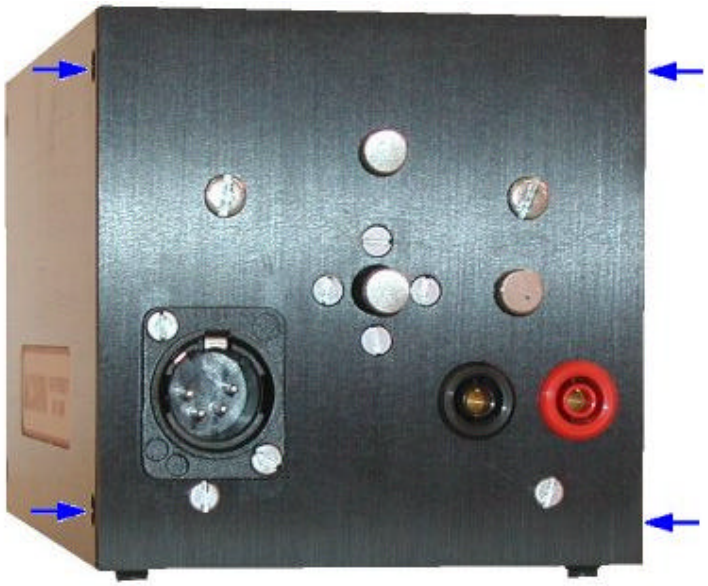
After removing the equipment from its packaging, first check the components for any obvious signs of damage. If all is well, the first stage in the installation is to fit the supplied lamp into the lamphouse. Be careful not to strain the lamp during installation, as it is easy to break off the cathode connection if significant bending or twisting forces are applied. If you have any problems in installing the lamp, please phone for further advice. Neither the manufacturer's nor our own guarantee, cover lamp breakage during installation, so please proceed with CARE!!

☠ **Disconnect the power supply before continuing.**

☠ **Arc lamps are pressurised and fragile. Ensure suitable protective eyewear is worn at all times while handling.**

1. To gain access to the lamp mount, the rear plate must be removed. There are four slotted screws, two on each side of the lamphouse, which secure this to the housing. After removing these screws the rear plate, which supports the lamp assembly, will slide out of the lamphouse to the rear.

Location of rear plate retaining screws



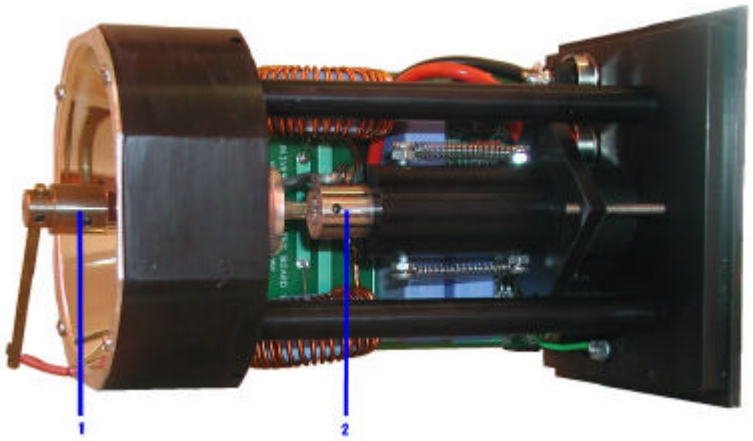
2. The lamp is mounted horizontally, and is fitted in place by passing the cathode (narrower end) through the central hole in the mirror and inserting in the mount. The lamp is secured by means of a hexagonal screw. To reduce shadowing effects ensure the nodule on the glass envelope of the lamp is pointing along the anode arm, towards the lower right hand corner of the lamphouse when viewed from the mirror face.

!! **Hold the lamp by the electrode base to avoid contact with the glass. Skin contact will leave behind a residue, which with heat will blacken and therefore reduce light intensity and the lamp's life.**

3. The front lamp fitting (the anode) will be clipped to one side for shipping. This should be released and fixed to the protruding end of the lamp, taking care not to touch the silica envelope surrounding the electrodes. To avoid arcing between the anode connector arm and the lamphouse, position the arm at 45º, pointing towards the bottom right hand corner of the lamphouse when viewed from the mirror face, in the same direction as the nodule on the lamp.
4. Carefully replace the lamp assembly in the lamphouse and replace the four retaining screws.

!! **If you inadvertently touch the envelope it is important to clean the lamp with the wipe provided to prevent grease residues burning on to the lamp and thus reducing its operating efficiency.**

Lamp assembly, viewed from above



1. Front lamp fitting and arm
2. Rear lamp mount

N.B. It is not possible to connect the lamp in the incorrect orientation, or fit the incorrect lamp, as the anode and cathode fittings are different for each.

2.4 Lamp Removal

☠ **Ensure the lamp is fully cooled & protective eyewear is worn before handling.**

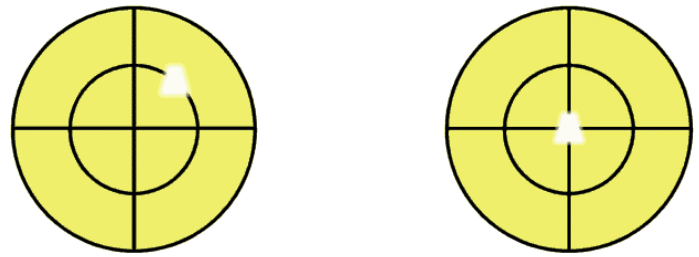
To change the lamp after it has reached the end of its useful life, remove the lamp assembly as described above and release the anode arm from the lamp. Slacken the fixing screw in the cathode mount and the lamp can then be removed through the central hole in the mirror. Fitting of the new lamp is as described above in section 2.3. The lamphouse enclosure reaches extremely high temperatures when in use and could cause severe burns, so please exercise extreme caution when exchanging lamps.

2.5 Illumination Set up sequence

With the lamp installed in the lamphouse, the next stage is to focus the light source.

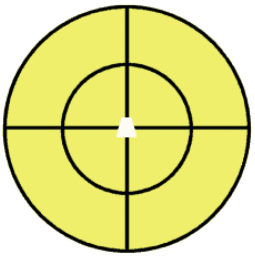
1. Connect the cabling to the lamphouse. There is a four-pin lamphouse power lead, which needs to be connected from the lamphouse to the power supply unit, and the power supply should be connected to the mains.
2. If not already in place, attach the output coupling tube to the light source, with the focussing assembly in place and the diaphragm fully open.

   N.B. If the focussing assembly is unavailable, the lamp should be focussed 55mm in front of the coupling tube, using a piece of black card as a target. This should be carried out only using suitable protective eyewear to ensure the adjustment can be made again at a future date!
3. Turn on the lamp and leave the unit to warm up for at least ten minutes and then adjust the lamp focus and position to give the sharpest image of the lamp arc at the centre of the focussing assembly, illustrated below. This ensures the maximum amount of light is focussed onto the entrance of the light guide.



✘ Unfocussed, uncentred

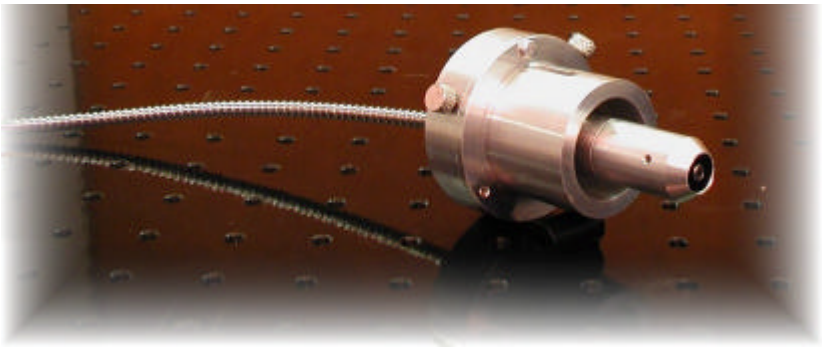
✘ Unfocussed, centred



✓ Focussed, centred

4. Turn off the lamp and remove the focussing assembly from the light source coupling before attaching the lamphouse light guide mount in its place, together with any filter sliders or filter wheel.
5. Fit one end of the light guide into the lamphouse mount, sliding it up to the stop. Secure in place using the small hex screw.

6. If supplied, fit the epifluorescence coupling assembly to the microscope (see separate instructions provided with the coupling). With the light guide mount detached from the microscope epifluorescence coupling, feed the free end of the light guide into the light guide mount and tighten in place at the end stop, as shown in the figure below. Replace the mount, with the light guide fitted, onto the end of the microscope coupling tube in the epifluorescence port of the microscope.



7. To focus the light beam, remove one of the microscope objectives and position the appropriate filter cube in the light path. Using a piece of fluorescent paper or card at the microscope stage as a target, adjust the position of the light guide mount until a sharp image of the end of the light guide is seen at the stage. Centre the image using the offset adjustments on the light guide mount.
8. Replace the microscope objective and check for uniform illumination at the image plane. The illumination path is now fully aligned and the system ready for use.
9. To ensure optimum performance from your lamp housing it is recommended that after approximately 1 hour from turn on fine focussing is carried using the detector attached to your system. Small adjustments of the horizontal, vertical and focussing controls on the lamp should be made to maximise the signal from the detector. We recommend that this fine calibration be repeated periodically during the lifetime of the lamp.

3 Technical Support

e-mail : tech@cairnweb.com
Web : http://www.cairnweb.com/

Address : Cairn Research Ltd
Unit 3G
Brents Shipyard Industrial Estate
Faversham
Kent
ME13 7DZ

Telephone : +44 (0) 1795 590 140
Fax : +44 (0) 1795 590 150